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Visual Organs of Lamellibranchs.—Dr. BENJAMIN SHARP reported on his work on the lamellibranch eye. He had examined the edge of the mantle of *Ostrea virginica* and *Mitilis edulis* of the Asiphonata, and the siphons of *Venus mercenaria*, *Mya arenaria*, *Mactra solidissima*, besides the forms already described for *Solen ensis* and *S. vagina* (Proc. of Academy of Nat. Sciences of Phila., 1883, pp. 248–9). The pigmented cells found in these parts are essentially the same as those found in *Solen ensis* and *S. vagina*. The smallest of all the cells were found in *Ostrea* and the largest in *Venus*. Experiments on these forms show their sensitiveness to light and shadow, and the cells showing the retinal character described leaves little doubt as to the power of vision. No nerves could be demonstrated passing direct to these cells, and probably those distributed to the general epidermis serve in transmitting the impressions. The visual power is so low that nerves have not been yet specialized for this purpose.

JANUARY 15.

The President, Dr. LEIDY, in the chair.

Twenty persons present.

A Phosphorescent Variety of Limestone.—Professor LEWIS gave a description of a remarkable substance found in one of the mountain mines of Utah, near Salt Lake City, sent to him some months ago by Professor Cope. It is a white rock which phosphoresces with a lurid red light whenever struck or scratched with a hard substance, and on that account has been called by the miners, *Hell-fire rock*.

It proves upon examination to be an almost perfectly pure carbonate of lime, containing occasionally slight impurities of iron, etc. It is a loose grained, white, crystalline limestone, the grains of which are but slightly coherent, giving the rock the appearance of a soft sandstone. Upon slight abrasion in the hand, it crumbles to form a coarse, calcareous sand. Under the microscope the rock appears as a loose mass of irregular, angular grains, which are nearly transparent, and which have a lustre resembling that of alum. Portions of the rock are colored slightly yellow by oxide of iron.

Its phosphorescent properties are very remarkable, entitling it to rank as a new variety of limestone. It was long ago noticed by Becquerel that some limestones were slightly phosphorescent after heating or insolation, but so far as known, no other limestone possesses this property in a degree at all approaching that now described, the phosphorescence of which is nearly as strong as that of fluor spar.

Phosphorescence is developed when the rock is either struck, scratched or heated. Upon using metal, glass or any other hard substance to strike or to scratch it, a deep red light is emitted, which continues sometimes for several seconds after the blow. Rubbing with other fragments or grinding in a mortar developed a white light. The most remarkable phosphorescence is developed by heating a fragment of the limestone in a glass tube over a flame. It then glows with a deep red light which lasts for a minute or more after withdrawing the flame. The color of the light emitted resembles that of a red-hot body. Several seconds before dying out, the light becomes white or bluish white. Upon cooling and subsequent heating, phosphorescence is again developed in the same fragment, but much more feebly and for a shorter period, and after two or three such heatings, its phosphorescence is destroyed.

Experiments made by the speaker upon the temperature at which "Hell-fire rock" became phosphorescent, showed that phosphorescence occurred at a temperature somewhat under 500° F. Small fragments phosphoresced much more quickly than large ones. The lurid red light produced by a blow from a hammer varied in duration of visibility according to the strength of the blow. The phosphorescence produced by a slight touch lasted only half a second, while a sharp blow produced a light which remained more than twenty seconds after the blow was given. Doubtless, a blow with a miner's pick upon the rock would cause still longer phosphorescence.

It was found that the phosphorescence developed by heating occurred nearly contemporaneously with the decrepitation of the calcite, and this fact may be of value in theoretical considerations.

A search through the collection of the Academy for limestones having similar properties resulted in finding a limestone from Kaghberry, India, which glowed with a strong yellow phosphorescent light when heated. No phosphorescence was produced by friction alone, as in the case of the Utah limestone. It was of great interest to find that this Indian limestone, and this one alone of all in the collection, had the precise external characters of that from Utah. It had the same crystalline structure and state of aggregation, crumbling readily in the fingers, and resembling a sandstone. It was labeled "Phosphorescent Sandstone," although containing no siliceous sand.

This similarity of external characters between the two phosphorescent limestones is certainly more than a coincidence. It confirms Becquerel's view that phosphorescence depends upon physical rather than chemical conditions. He has shown that when Aragonite is calcined, fused with sulphur and then heated, it phosphoresces with a green light; whereas calcite, similarly treated, gives a yellow light; from which he concludes that the different colors depend upon different crystalline states, the composition remaining the same.

The speaker had been fortunate enough to observe the rare phenomenon of the phosphorescence of snow, having seen a snow-covered Alpine mountain shining at night as though illuminated by moonlight. This beautiful appearance lasted for about half an hour only, and was confined to a single mountain. Here again the phosphorescence, although of quite a different kind from either of those mentioned above, was purely physical, depending upon the assumption of a certain crystalline condition of the snow.

In general, the phosphorescence of a substance may be said to depend upon an alteration in its molecular state of aggregation. In the case of "Hell-fire rock" it appears to be the result of a disturbance of its loosely aggregated crystalline particles, whether such disturbance be produced by percussion, friction, heat or decrepitation.

The New Jersey Coast after the storm of Jan. 8, 1884.—Professor Leidy stated that, in company with Dr. Sharp and Mr. Ford, he had made a trip to Atlantic City, N. J., to observe the result of the recent storm on the marine animals of our coast. The shore at the highest line reached by the tides was for miles covered with incalculable numbers of the Beach-clam, *Mactra solidissima.* These in many places formed extensive patches actually closely paved with the clams. Besides those visible, it is probable as many or more were covered by the sand thrown up with the clams. Until this evidence of the storm, he had no suspicion that the mollusk was so exceedingly abundant on the coast, though he had been well aware that it was very common, and had repeatedly seen large quantities thrown on shore under similar circumstances. With the Mactra were other mollusks, and, though numerous enough, they appeared to be few compared with the former. These were *Fulgur carica* and *F. canaliculata*, *Natica heros* and *N. duplicata*, and *Nassa obsoleta.* Hermit crabs were also numerous, *Eupagurus pollicaris* in shells of Natica and Fulgur, and *E. longicarpus* in shells of Nassa The former shells had attached abundance of *Crepidula unguiformis*, and occasionally on the outside a *C. fornicata.* Of other crabs, the Spider-crab, *Libinia canaliculata* and *Platyonichus ocellatus* were frequent. A few half-grown Horse-shoe crabs, *Limulus polyphemus*, were also observed. A few bunches of *Mytilus edulis* were occasionally met with.

It seemed remarkable that certain common mollusks were conspicuously absent, as the Oyster, *Ostrea virginiana*, the Clam, *Venus mercenaria*, the Squirt-clam, *Mya arenaria*, and the Horse mussel, *Modiola plicatula.* Scarcely any annelides were observed,